



10/30/00

**NONPROVISIONAL PATENT APPLICATION**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

OLIFF & BERRIDGE, PLC  
P.O. Box 19928  
Alexandria, Virginia 22320  
Telephone: (703) 836-6400  
Facsimile: (703) 836-2787

Attorney Docket No.: 107427

Date: October 30, 2000

**BOX PATENT APPLICATION****NONPROVISIONAL APPLICATION TRANSMITTAL  
RULE §1.53(b)**

Director of the U.S. Patent and Trademark Office  
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 C.F.R. §1.53(b) is the nonprovisional patent application

For (Title): CONTROL APPARATUS AND METHOD FOR INPUT SCREENSBy (Inventors): Hiroshi KISHI; Hiroshi YAMAUCHI and Noritada YOSHITSUGU

- ☒ Formal drawings (Figs. 1-9: 7 sheets) are attached.  
☒ A Declaration and Power of Attorney is filed herewith.  
☒ An assignment of the invention to TOYOTA JIDOSHA KABUSHIKI KAISHA is filed herewith.  
☒ An Information Disclosure Statement is filed herewith.  
☐ Entitlement to small entity status is hereby asserted.  
☐ A Preliminary Amendment is filed herewith.  
☐ Please amend the specification by inserting before the first line the sentence --This nonprovisional application claims the benefit of U.S. Provisional Application No. \_\_\_\_\_, filed \_\_\_\_\_.  
☒ Priority of foreign application No. 2000-256098 filed August 25, 2000 in Japan is claimed (35 U.S.C. §119).  
☒ A certified copy of the above corresponding foreign application(s) is filed herewith.  
☒ The filing fee is calculated below:

**CLAIMS IN THE APPLICATION AFTER ENTRY OF  
ANY PRELIMINARY AMENDMENT NOTED ABOVE**

FOR:	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	20 - 20	= 0
INDEP CLAIMS	9 - 3	= 6
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIMS PRESENTED		

\* If the difference is less than zero, enter "0".

- ☒ Check No. 113262 in the amount of \$1,190.00 to cover the filing fee is attached. Except as otherwise noted herein, the Director is hereby authorized to charge any other fees that may be required to complete this filing, or to credit any overpayment, to Deposit Account No. 15-0461. Two duplicate copies of this sheet are attached.

**SMALL ENTITY**

RATE	FEE
	\$ 355
x 9 =	\$
x 40 =	\$
+ 135 =	\$
TOTAL	\$

**OTHER THAN A  
SMALL ENTITY**

RATE	FEE
	\$ 710
x 18 =	\$
x 80 =	\$ 480
+ 270 =	\$
TOTAL	\$1,190

Respectfully submitted,

James A. Oloff  
Registration No. 27,075

Thomas J. Pardini  
Registration No. 30,411

JAO:TJP/fpw

## **Inventor Information**

Inventor One Given Name:: Hiroshi  
Family Name:: KISHI  
Name Suffix::  
City of Residence:: Toyota-shi  
State or Prov. of Residence:: Aichi-ken  
Country of Residence:: JAPAN  
Inventor Two Given Name:: Hiroshi  
Family Name:: YAMAUCHI  
Name Suffix::  
City of Residence:: Kariya-shi  
State or Prov. of Residence:: Aichi-ken  
Country of Residence:: JAPAN  
Inventor Three Given Name:: Noritada  
Family Name:: YOSHITSUGU  
Name Suffix:: Aichi-gun  
City of Residence:: Aichi-ken  
State or Prov. of Residence::  
Country of Residence:: JAPAN  
Inventor Four Given Name::  
Family Name::  
Name Suffix::  
City of Residence::  
State or Prov. of Residence::  
Country of Residence::  
Inventor Five Given Name ::  
Family Name::  
Name Suffix::  
City of Residence::  
State or Prov. of Residence::  
Country of Residence::

## **Correspondence Information**

Name Line One:: Oliff & Berridge PLC  
Address Line One:: P.O. Box 19928  
City:: Alexandria  
State or Province:: VA  
Postal or Zip Code:: 22320  
Telephone:: (703) 836-6400  
Fax:: (703) 836-2787  
Electronic Mail:: commcenter@oliff.com

## **Application Information**

Title Line One::  
Title Line Two:: CONTROL APPARATUS AND MEHTOD FOR  
Title Line Three:: INPUT SCREENS  
Title Line Four::

Total Drawing Sheets:: 7  
Docket Number:: 107427

### Continuity Information

>This application is a:  
Application One::  
Filing Date::  
Patent Number::  
which is a:  
>>Application Two::  
Filing Date::  
Patent Number::

### Prior Foreign Applications

Foreign Application One:: 2000-256098  
Filing Date:: August 25, 3000  
Country:: JAPAN  
Priority Claimed:: Yes  
Foreign Application Two::  
Filing Date::  
Country::  
Priority Claimed::  
Foreign Application Three::  
Filing Date::  
Country::  
Priority Claimed::

## CONTROL APPARATUS AND METHOD FOR INPUT SCREENS

## INCORPORATION BY REFERENCE

5     The disclosure of Japanese Patent Application No. 2000-256098 filed on August 25, 2000 including the specification, drawings and abstract is incorporated herein by reference in its entirety.

## BACKGROUND OF THE INVENTION

10

1. Field of the Invention

The invention relates to a control apparatus and method for input screens that includes display means such as a display used for a navigation system installed in a vehicle or a computer exchanging information with external components.

15

2. Description of Related Art

As disclosed in Japanese Patent Application Laid-Open No. HEI 10-90390, this kind of apparatus has display means for displaying information including map information and current position information, operation means provided to control contents displayed by the display means and designed to be operated by a passenger, and prohibition means for prohibiting the displayed contents from being controlled by the operation means while the vehicle is traveling. The displayed contents cannot be controlled through operation of the operation means while the vehicle is traveling. Thereby restrictions are imposed on operation of the operation means by the driver.

20

25

However, according to the aforementioned art, since displayed contents cannot be controlled at all through operation of the operation means while the vehicle is traveling, the vehicle has to stop to update the displayed

contents. This is inconvenient, for example, when driving along an expressway where it is difficult to stop.

#### SUMMARY OF THE INVENTION

5

In a first aspect of the invention, there is provided a control apparatus for input screens that is installed in a vehicle and constructed to input predetermined operation performed by an operator based on information displayed by display device as an operator guidance and change information to be displayed by the display device upon input of the operator guidance, comprising operation nullification device that prohibits the predetermined operation performed by the operator from being inputted as the operator guidance upon fulfillment of a predetermined condition and operation nullification canceller that cancels prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance if a predetermined time period has elapsed since the prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance.

According to this construction, if a predetermined condition is fulfilled, for example, if a vehicle equipped with the control apparatus has made a transition from its stopped state to its traveling state or if operator guidance has continuously been issued a predetermined times or if information has been changed based on the operator guidance (including the switching of screens), predetermined operation performed by the operator is prohibited from being inputted as operator guidance. In other words, since input operation by the operator is prohibited, displayed information is not changed even if the operator has performed predetermined operation. On the other hand, if a predetermined time period has elapsed after prohibition against the input operation, the prohibition is canceled. Therefore, the operator

can continue to operate, for example, without stopping the vehicle. Also, the operator can further increase his or her attention on the driving for the predetermined time period.

In this case, the operation nullification device is preferably constructed to judge whether or not the predetermined condition has been fulfilled, depending on information displayed by the display device. For example, the information displayed on the screen includes the number of dummy switches included in the screen to be selectively operated by the operator, the size of the dummy switches and the like.

According to this construction, it is judged whether or not a predetermined condition for prohibiting input operation has been fulfilled, depending on the complexity of displayed information. Accordingly, input operation can be prohibited at a timing better suited for the driving of the vehicle.

This control apparatus preferably comprises first operation device for performing the predetermined operation based on a first action made by the operator and second operation device for performing the predetermined operation based on a second action made by the operator. The second action is different from the first action. The operation nullification device judges whether or not the predetermined condition has been fulfilled, depending on whether the predetermined operation is performed by the first operation device or by the second operation device. The first operation device includes, for example, a touch switch panel (whose display is touched for operation of dummy switches) and a switch device. The second operation device includes, for example, a remote controller equipped with a joystick.

According to this construction, it is judged whether the condition for prohibiting input operation has been fulfilled, depending on a method of issuing operator guidance (i.e. complexity of operator guidance). Therefore, input operation can be prohibited at a timing better suited for the driving of the vehicle.

In a second aspect of the invention, there is provided a control apparatus for input screens that is installed in a vehicle, comprising screen controller that causes display device to display information including a plurality of dummy switches and changing the information displayed by the display  
5 device to information corresponding to the operated dummy switch and operation nullification device that nullifies operation of the dummy switch upon fulfillment of a predetermined condition and prohibiting information displayed by the display device from being changed based on the operation. In this control apparatus, the operation nullification device is constructed to  
10 judge whether or not the predetermined condition has been fulfilled, depending on the number of dummy switches included in information displayed by the display device.

According to this construction, information including a plurality of dummy switches is displayed by the display device. If the operator selectively  
15 operates one of the dummy switches, the displayed information is updated. This newly displayed information also includes a plurality of dummy switches and is changed into other information through selective operation by the operator. In this manner, the displayed information is sequentially changed so that a dummy switch desired by the operator is eventually  
20 operated. On the other hand, if a predetermined condition is fulfilled, operation of a dummy switch is nullified and information displayed by the display device is not changed. It is judged whether the predetermined condition has been fulfilled, depending at least on the number of dummy switches included in the displayed information. Accordingly, for example, if  
25 it is estimated that a great number of dummy switches are included in the displayed information and that a long time period is required to select one of the dummy switches, operation of the dummy switch can be nullified at an early stage and the nullification can be carried out at a suitable timing.

In this case, the control apparatus preferably comprises operation

nullification canceller that cancels nullification of operation of the dummy switch if a predetermined time period has elapsed since the start of nullification of the operation by the operation nullification device.

According to this construction, nullification of operation is canceled if a  
5 predetermined time period has elapsed since the nullification. Therefore, the operator can continue to operate, for example, without stopping the vehicle. Also, the operator can further increase his or her attention on the driving for the predetermined time period.

Also, the control apparatus preferably comprises operation nullification  
10 canceller that cancels nullification of the operation of the dummy switch by the operation nullification device if the vehicle has stopped.

According to this construction, it is possible to operate input screens while the vehicle is stopped.

In a third aspect of the invention, there is provided a control apparatus for  
15 input screens that is installed in a vehicle and constructed to cause display device to display information including a plurality of dummy switches and cause the display device to display new information corresponding to one of the dummy switches that has selectively been operated, comprising summation time period calculator that estimates a time period required for  
20 an operator to watch the displayed information to selectively operate one of the dummy switches included in the displayed information during a period from the start to the stop of the vehicle, estimates a time period required for the operator to watch newly displayed information to selectively operate one of a plurality of dummy switches included in the newly displayed information,  
25 and calculates a sum of the estimated time periods, and operation nullification device that nullifies operation performed by the operator for selection of one of a plurality of dummy switches included in the newly displayed information if the summation time period is longer than a reference time period, and prohibits new information corresponding to the



operated dummy switch from being displayed by the display device.

According to this construction, during a period from the start to the stop of the vehicle, a time period required for the operator to watch the displayed information to selectively operate one of a plurality of dummy switches included in the displayed information and a time period required for the operator to watch newly displayed information to selectively operate one of a plurality of dummy switches included in the newly displayed information are estimated. Then a sum of the estimated time periods is calculated. If the summation time period is longer than a reference time period, the selective operation of the dummy switch included in the newly displayed information is nullified. Accordingly, if it is estimated that a great number of dummy switches are included in the displayed information and that a long time period is required to select one of the dummy switches, operation of the dummy switch can be nullified at an early stage and the nullification can be carried out at a suitable timing.

In the control apparatus for input screens having the aforementioned features, it is preferable to provide operation nullification canceller that cancels nullification of operation of the dummy switch if a predetermined time period has elapsed since the start of nullification of the operation by the operation nullification device.

According to this construction, if a predetermined time period has elapsed since nullification of operation, the nullification is canceled. Therefore, the operator can continue to operate, for example, without stopping the vehicle. Also, the operator can further increase his or her attention on the driving for the predetermined time period.

In the control apparatus for input screens having the aforementioned features, it is preferable to cancel nullification of operation of the dummy switch by the operation nullification device if the vehicle has stopped.

According to this construction, it is possible to operate input screens while

the vehicle is stopped.

In the control apparatus for input screens having the aforementioned features, the summation time period calculator is preferably constructed to calculate the summation time period for information that is displayed after  
5 cancel of nullification of the operation.

According to this construction, nullification of operation is prevented from being carried out too frequently. Therefore, input screens can be operated smoothly.

In the control apparatus for input screens having the aforementioned  
10 features, the summation time period calculator is preferably constructed to estimate a time period required to watch the displayed information, depending on the number of the dummy switches included in the information.

This is because the time period required to watch the screen increases with  
15 increases in the number of dummy switches included in displayed information.

In the control apparatus for input screens having the aforementioned features, it is preferable to employ the following construction. That is, the control apparatus further comprises first operation device for performing  
20 operation of the dummy switch based on a first action made by the operator and second operation device for performing operation of the dummy switch based on a second action made by the operator. The second action is different from the first action. The summation time period calculator is preferably constructed to estimate a time period required to watch the  
25 information, depending on whether the operation of the dummy switch is performed by the first operation device or by the second operation device.

This is because the time period required to watch the screen increases with increases in complexity of selective operation of dummy switches.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a general view of a control apparatus for input screens according to a first embodiment of the invention;

5 Fig. 2 is a flowchart showing a routine executed by a microcomputer shown in Fig. 1;

Figs. 3A through 3E show in a time series manner screens displayed on a display device shown in Fig. 1 by the microcomputer shown in Fig. 1;

10 Figs. 4A through 4D show in a time series manner screens displayed on the display device shown in Fig. 1 by the microcomputer shown in Fig. 1;

Fig. 5 is a table to which the microcomputer shown in Fig. 1 refers when calculating a screen-watching estimated time period;

Figs. 6A through 6C show in a time series manner screens displayed on the display device shown in Fig. 1 by the microcomputer shown in Fig. 1;

15 Fig. 7 is a general view of a control apparatus for input screens according to a second embodiment of the invention;

Fig. 8 is a flowchart showing part of a routine executed by a microcomputer shown in Fig. 7; and

20 Fig. 9 is a table to which the microcomputer shown in Fig. 7 refers when calculating a screen-watching estimated time period.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Hereinafter, embodiments of a control apparatus for input screens (a  
25 screen display device) of the invention will be described with reference to the drawings. A control apparatus for input screens according to a first embodiment of the invention as generally shown in Fig. 1 is composed of a display unit 10 designed as display device, a switch portion 20, and a control unit 30 to which the display unit 10 and the switch portion 20 are connected.

The display unit 10 includes a liquid-crystal color display functioning also as a so-called touch switch panel and displays geographical information and information (a screen) including a plurality of dummy switches (list change-over switches) in accordance with a signal from the control unit 30. In a state where information (a screen) including a plurality of dummy switches is displayed, if one of the dummy switches is selectively operated (touched) by the operator, the display unit 10 sends out to the control unit 30 a signal designative of the operated dummy switch (a signal designative of a position on the screen that has been touched).

The switch portion 20 has a plurality of push-button switches such as a menu switch 21, an image quality adjustment guidance switch 22, an audio-operation selecting switch 23 and the like, and sends out to the control unit 30 a signal designative of the operated switch.

The control unit 30 is constructed to include a microcomputer 31, and is connected to a vehicle speed sensor 41 for detecting a speed (a vehicle speed) of a vehicle in which the control apparatus for input screens is installed, a navigation device 42 mainly for displaying a position of the vehicle on a map, and an audio equipment 43 for the vehicle, as well as the display unit 10 and the switch portion 20. The control unit 30 receives necessary information from these components and sends out necessary signals to them. In combination with the display unit 10, the switch portion 20 and the navigation device 42, the control unit 30 constitutes a navigation system.

To be more specific, the microcomputer 31 of the control unit 30 sends out information on a screen to be displayed on the display unit 10 and controls (changes and updates) the information (the displayed screen) displayed by the display unit 10. In a state where information including a plurality of dummy switches is displayed by the display unit 10, if a signal designative of a dummy switch to be selectively operated by the display unit 10 is inputted, the microcomputer 31 operates in a manner corresponding to the designated

(i.e. selectively operated) dummy switch. This operation includes displaying new information (which may include a plurality of dummy switches) on the display unit 10, causing the navigation device 42 to recognize a destination and calculate a required time period and the like, and sending out to the audio equipment 43 a guidance signal for changing volume and tone.

Next, operation of the control apparatus for input screens will be described with reference to Figs. 2 through 6. Fig. 2 shows a flowchart of a routine (a program) executed by the microcomputer 31 of the control unit 30 when the operator operates the menu switch 21 of the switch portion 20. Figs. 3, 4 and 6 conceptually show information (a screen) displayed by the display unit 10 when the microcomputer 31 executes the routine shown in Fig. 2. Fig. 5 is a table of preliminarily experimentally gathered data of a time period (a screen-watching estimated time period I) required for the operator to watch displayed information (a screen) until he or she selectively operates (touches) two of a plurality of dummy switches included in the information (the screen) with a finger, in connection with the number of dummy switches included in the information (the screen). This table is stored in a memory (not shown) in the control unit 30 and referred to by the microcomputer 31 when executing the routine shown in Fig. 2.

(1) First of all, the description will be made as to a case where the menu switch 21 of the switch portion 20 is operated when the vehicle is stopped. The microcomputer 31 starts processings of the routine shown in Fig. 2 from STEP 200 and then proceeds to STEP 205. In STEP 205, the microcomputer 31 displays a menu-initial-operation screen shown in Fig. 3A on the display unit 10. In this example, the menu-initial-operation screen includes six dummy switches.

Next, the microcomputer 31 proceeds to STEP 210 to set a post-cancel-of-nullification operation number  $n$  to "1", and proceeds to STEP 215 to set the

value of a timer T to "0". The post-cancel-of-nullification operation number n is a variable indicative of the number of operations of a dummy switch after nullification of operation of the dummy switch (restriction on the operation of the dummy switch) has been cancelled. Nullification of operation means that operation of the dummy switch is not accepted and that no action corresponding to the operation is made (i.e. that input operation is prohibited). Next, the microcomputer 31 proceeds to STEP 220 to judge based on a signal from the vehicle speed sensor 41 whether or not the vehicle is traveling. Now that the vehicle is stopped, the microcomputer 31 makes a negative judgment in STEP 220 and proceeds to STEP 225 to reset the post-cancel-of-nullification operation number n to "0".

Then the microcomputer 31 proceeds to STEP 230 to cancel nullification of operation of a dummy switch in the displayed screen. If the dummy switch is operated, the microcomputer 31 regards the operation as valid and realizes a state where an action corresponding to the operation can be made. As will later be described, if operation of a dummy switch in the displayed screen has been nullified, the dummy switch is displayed with its tone lowered (in a dark state). Thus, the tone of the dummy switch is restored to its normal tone through execution of STEP 230. At the present stage, since the operation of the dummy switch has not been nullified, execution of STEP 230 does not cause any changes.

Next, the microcomputer 31 proceeds to STEP 235 to judge based on a signal from the display unit 10 whether or not one of the dummy switches has been operated (touched by a finger of the operator). At this moment, if no dummy switch has been operated, the microcomputer 31 makes a negative judgment in STEP 235 and returns to STEP 220. As a result, as long as the vehicle is stopped, STEPS 220 through 235 are repeatedly executed. It is monitored in STEP 235 whether or not one of the dummy switches has been operated.

If the operator selectively operates one of a plurality of dummy switches shown in Fig. 3A, the microcomputer 31 makes a positive judgment in STEP 235, proceeds to STEP 240 to reset the value of the timer T and start clocking operation by means of the timer T, and proceeds to STEP 245 to display a new screen corresponding to the selected dummy switch. In the example of Fig. 3, a dummy switch a is selectively operated based on the screen shown in Fig. 3A, and a new screen including a plurality of (six) dummy switches shown in Fig. 3B is displayed. That is, STEPS 235, 245 constitute screen control means for inputting as an operator guidance a predetermined action by the operator, namely, an action of selectively operating one of a plurality of dummy switches (information) displayed by the display unit 10, and for changing (switching) information (screens) displayed by the display unit 10 in accordance with the inputted operation.

Next, the microcomputer 31 proceeds to STEP 250 to increase the post-cancel-of-nullification operation number n by "1", and proceeds to STEP 255 to judge whether or not the operation of the dummy switch has been terminated. Termination of operation of a dummy switch means that a final action to be made is determined by the operated dummy switch and that further operations of dummy switches are not required. In the example of Fig. 3, operation of dummy switches is performed four times, and expressways in a specific region shown in Fig. 3E are displayed as a final action. Thus, at this stage, the operation has not been terminated. Accordingly, the microcomputer 31 makes a negative judgment in STEP 255 and returns to STEP 220.

Hereinafter, as long as the vehicle is stopped, the microcomputer 31 repeatedly executes STEPS 220 through 235. Every time one of newly displayed dummy switches is selectively operated, the microcomputer 31 executes STEPS 240 through 255. As a result, the screen displayed by the display unit 10 is sequentially switched to a screen corresponding to a

dummy switch that has been selectively operated. In the example of Fig. 3, dummy switches a2, a2-5 are selected from screens shown in Figs. 3B, 3C, whereby screens shown in Figs. 3C, 3D are displayed respectively.

If, for example, a dummy switch a2-53 is selected from a plurality of  
5 dummy switches included in the screen shown in Fig. 3D, a final screen shown in Fig. 3E is displayed so that further selective operations of dummy switches become unnecessary. Accordingly, the microcomputer 31 makes a positive judgment in STEP 255 and proceeds to STEP 295 to terminate the present routine. In this manner, if the vehicle is stopped (if the vehicle is  
10 not traveling), operations of dummy switches are not nullified.

(2) The following description will be made with reference to Fig. 4 as to a case where the vehicle is traveling. For convenience of explanation, it is assumed herein that dummy switches to be operated for selection from displayed screens are identical to those which have been described with  
15 reference to Fig. 3. Accordingly, Figs. 4A through 4D correspond to Figs. 3A through 3D respectively. It is assumed herein that a required time period from operation of one dummy switch to operation of the next dummy switch is approximately equal to a time period required for normal operation.

Also in this case, if the operator operates the menu switch 21, the  
20 microcomputer 31 starts the processings of the routine shown in Fig. 2 from STEP 200 and proceeds to STEP 205 to display a menu-initial-operation screen shown in Fig. 4A on the display unit 10. Then the microcomputer 31 proceeds to STEP 210 to set the post-cancel-of-nullification operation number n to "1", proceeds to STEP 215 to set the value of the timer T to "0",  
25 and proceeds to STEP 220 to judge whether or not the vehicle is traveling. In this case, since the vehicle is traveling, the microcomputer 31 makes a positive judgment in STEP 220 and proceeds to STEP 260 to judge whether or not the timer T indicates a value greater than a reference value (a reference time period) Ta.



Because the value of the timer T is set to "0" in STEP 215, it is smaller than the reference value Ta. Accordingly, the microcomputer 31 makes a negative judgment in STEP 260 and proceeds to STEP 265. In STEP 265, the microcomputer 31 refers to the table shown in Fig. 5, reads out a screen-watching estimated time period  $I (= 2 \text{ (seconds)})$  corresponding to the number of dummy switches  $j (= 6)$  included in a currently displayed screen (in this case, the menu-initial-operation screen shown in Fig. 4A), and stores it as a screen-watching estimated time period  $I(n) = I(1)$  corresponding to the post-cancel-of-nullification operation number n.

10 Next, the microcomputer 31 proceeds to STEP 270 and calculates a sum Z of screen-watching estimated time periods (a summation time period) according to an equation shown in STEP 270. At this stage, since n has been set to "1" in STEP 215, the summation time period Z is equal to  $I(1) = 2$  (seconds). Next, the microcomputer 31 proceeds to STEP 275 to judge  
15 whether or not the calculated summation time period Z is longer than a reference time period Tb (e.g. 6 (seconds)).

In this case, since the summation time period  $Z (= 2 \text{ (seconds)})$  is shorter than the reference time period Tb ( $= 6 \text{ (seconds)}$ ), the microcomputer 31 makes a negative judgment in STEP 275 and proceeds to STEP 230 to cancel  
20 nullification of operation of a dummy switch in the displayed screen. At this stage, since operation of the dummy switch has not been nullified, execution of STEP 230 does not cause any changes.

Next, the microcomputer 31 proceeds to STEP 235 to judge whether or not operation of a dummy switch has been performed. If no such operation has  
25 been performed, the microcomputer 31 makes a negative judgment in STEP 235 and returns to STEP 220. Thereafter, while the vehicle is traveling, STEPS 220, 260 through 275, 230 and 235 are repeatedly executed. It is monitored in STEP 235 whether or not operation of a dummy switch has been performed.

If the operator selectively operates one of a plurality of dummy switches shown in Fig. 4A, the microcomputer 31 makes a positive judgment in STEP 235, proceeds to STEP 240 to reset the value of the timer T and start clocking operation by means of the timer T, and then proceeds to STEP 245 to display  
 5 a new screen corresponding to the selected dummy switch. In the example of Fig. 4, the dummy switch a is selectively operated based on the screen shown in Fig. 4A, and a screen shown in Fig. 4B is displayed.

Next, the microcomputer 31 proceeds to STEP 250 to increase the post-cancel-of-nullification operation number n by "1" to "2", and proceeds to  
 10 STEP 255 to judge whether or not the operation of the dummy switch has been terminated. At this stage, since the operation of the dummy switch has not been terminated, the microcomputer 31 makes a negative judgment in STEP 255 and returns to STEP 220.

At this moment, since the vehicle is traveling, the microcomputer 31  
 15 makes a positive judgment in STEP 220 and proceeds to STEP 260. Because the value of the timer T has just been reset in STEP 240, it indicates a time period shorter than the reference time period  $T_a$ . Accordingly, the microcomputer 31 makes a negative judgment in STEP 260, and proceeds to STEP 265 to read out a screen-watching estimated time period  $I = 2$  (seconds)  
 20 corresponding to the number  $j = 6$  of dummy switches included in the currently displayed screen (i.e. the screen shown in Fig. 4B) and store it as a screen-watching estimated time period  $I(n) = I(2)$  corresponding to the post-cancel-of-nullification operation number ( $=2$ ).

Thus, a sum Z of screen-watching estimated time periods (a summation  
 25 time period) can be calculated as  $Z = I(1) + I(2) = 2 + 2 = 4$  (seconds). However, since this summation time period is shorter than the reference time period  $T_b (= 6$  (seconds)), the microcomputer 31 makes a negative judgment in STEP 275 and proceeds to STEP 230 to cancel nullification of the operation of the dummy switch. Also in this case, since the operation of

the dummy switch has not been nullified, execution of STEP 230 does not cause any changes. Next, the microcomputer 31 proceeds to STEP 235 to judge whether or not operation of a dummy switch has been performed. If no such operation has been performed, the microcomputer 31 returns to STEP 220. Thereafter, as long as the vehicle is traveling, STEPS 220, 260 through 275, 230 and 235 are repeatedly executed. It is monitored in STEP 235 whether or not operation of a dummy switch has been performed.

Meanwhile, the value of the timer T gradually increases. However, the next dummy switch is operated before the value of the timer T reaches the reference time period Ta. Therefore, the microcomputer 31 makes a positive judgment in STEP 235 before making a positive judgment in STEP 260. As a result, the microcomputer 31 proceeds to STEP 240 to again reset the value of the timer T and start clocking operation, and proceeds to STEP 245 to display a new screen. In the example of Fig. 4, the dummy switch a2 is operated for selection from a plurality of dummy switches included in the screen shown in Fig. 4B, and the screen shown in Fig. 4C is displayed.

Next, the microcomputer 31 proceeds to STEP 250 to increase the post-cancel-of-nullification operation number n by "1" to "3". Because operation of a finally required dummy switch has not been terminated yet, the microcomputer 31 makes a negative judgment in STEP 255 and returns to STEP 220. Also in this case, the vehicle is traveling, and the timer T indicates a small value. Therefore, the microcomputer 31 makes a positive judgment in STEP 220, makes a negative judgment in STEP 260, and proceeds to STEP 265 to read out a screen-watching estimated time period  $I(n) = I(3)$  from the table.

At this moment, in the example of Fig. 4, since a screen including the six dummy switches shown in Fig. 4C is displayed, the screen-watching estimated time period  $I(3)$  is equal to 2 (seconds). Accordingly, the summation time period Z calculated in STEP 270 is equal to  $I(1) + I(2) + I(3)$

= 6 (seconds). Thus, the microcomputer 31 makes a negative judgment in STEP 275 and proceeds to STEP 230 and the following STEPS. Accordingly, selective operation of the dummy switch is not nullified.

Thereafter, as in the aforementioned case, it is monitored in STEP 235 whether or not operation of a dummy switch has been performed. Accordingly, if one of the dummy switches shown in Fig. 4C (e.g. the dummy switch a2-5) is selected, the microcomputer 31 makes a positive judgment in STEP 235, proceeds to STEP 240 to again reset the value of the timer T to "0" and start clocking operation, and proceeds to STEP 245 to display a new screen corresponding to the dummy switch a2-5 (the same screen as shown in Fig. 3D). As will later be described, this screen is displayed instantaneously.

Next, the microcomputer 31 increases the post-cancel-of-nullification operation number n by "1" to "4". Because operation of a finally required dummy switch has not been terminated yet, the microcomputer 31 makes a negative judgment in STEP 255 and returns to STEP 220. Also in this case, the vehicle is traveling, and the timer T indicates a small value. Therefore, the microcomputer 31 makes a positive judgment in STEP 220, makes a negative judgment in STEP 260, and proceeds to STEP 265 to read out a screen-watching estimated time period  $I(n) = I(4)$  from the table.

In this case, since a screen including the six dummy switches shown in Fig. 3D is displayed, the screen-watching estimated time period  $I(4)$  is equal to 2 (seconds). Accordingly, the summation time period Z calculated in STEP 270 is equal to  $I(1) + I(2) + I(3) + I(4) = 8$  (seconds). This is longer than the reference time period  $T_b = 6$  (seconds).

As a result, the microcomputer 31 makes a positive judgment in STEP 275 and proceeds to STEP 280 to perform a processing of nullifying operation of a dummy switch in the displayed screen (a processing of prohibiting predetermined operation by the operator from being inputted as an operator

guidance). To be more specific, even in the case where one of the dummy switches in this screen has selectively been operated, all the operations thereof (including the changing of displayed information and the switching of screens) are prohibited, and the tone of the dummy switches in the displayed screens is lowered. Also, as shown in Fig. 4D, a notice "Do not use while the vehicle is traveling. Please operate after the vehicle has stopped." is displayed at the center of the screen for a predetermined time period (e.g. 5 seconds).

Hereinafter, as long as the vehicle is traveling, the microcomputer 31 repeatedly executes STEPS 220 and 260 through 280, and nullification of the operation of the dummy switch is continued. On the other hand, the value of the timer T gradually increases during this period. Accordingly, the value of the timer T indicates a time period longer than the reference time period  $T_a$  after the lapse of a predetermined time period. Thus, the microcomputer 31 makes a positive judgment in STEP 260, proceeds to STEP 225 to set the post-cancel-of-nullification operation number  $n$  to "0", and proceeds to STEP 230 to cancel nullification of the operation of the dummy switch.

Hereinafter, the microcomputer 31 repeatedly executes STEPS 235, 220, 260, 225 and 230. It is monitored in STEP 235 whether or not operation of a dummy switch has been performed. As a result, if one of a plurality of dummy switches shown in Fig. 3D (e.g. a2-53) is operated, the microcomputer 31 makes a positive judgment in STEP 235, proceeds to STEP 240 to again reset the value of the timer T to "0" and start clocking operation, and proceeds to STEP 245 to display a new screen (information shown in Fig. 3E) corresponding to the dummy switch a2-53. The microcomputer 31 increases the post-cancel-of-nullification operation number  $n$  by "1" in STEP 250, and proceeds to STEP 255 to judge whether or not the operation of the dummy switch has been terminated. In this case, the screen shown in Fig.

3E is a final one, and additional selective operation of dummy switches is unnecessary. Accordingly, the microcomputer 31 makes a positive judgment in STEP 255, and proceeds to STEP 295 to terminate the present routine. Thus, while the vehicle is traveling, if the sum Z of screen-watching  
 5 estimated time periods I(n) exceeds the reference time period Tb, input operation is nullified. If the reference time period Ta has elapsed since then, nullification of the input operation is canceled.

(3) The following description will be made as to a case where the vehicle makes a transition from its traveling state to its stopped state in a situation  
 10 where operation of a dummy switch has been nullified through execution of STEP 280. In the situation where the operation of the dummy switch has been nullified, the microcomputer 31 repeatedly executes STEPS 220 and 260 through 280. Accordingly, if the vehicle makes a transition from its traveling state to its stopped state, the microcomputer 31 makes a negative  
 15 judgment in STEP 220, and proceeds to STEPS 225, 230 to set the post-cancel-of-nullification operation number n to "0" and cancel nullification of the operation of the dummy switch, as in the case where the value of the timer T has become greater than the reference value Ta.

(4) The following description will be made as to a case where the value of  
 20 the timer T exceeds the reference time period Ta in a situation where the vehicle is traveling and where operation of a dummy switch in the currently displayed screen has not been nullified. The dummy switch a2 is operated for selection from the screen shown in Fig. 4B, and the screen shown in Fig. 4C is thereby displayed. The following description will be made as to an  
 25 example where a sufficiently long time period elapses before the dummy switch a2-5 is operated for selection from the screen shown in Fig. 4C.

If the dummy switch a2 is operated for selection from the screen shown in Fig. 4B, the microcomputer 31 proceeds to STEP 240 to reset the value of the timer T and start clocking operation, and proceeds to STEP 245 to display

the screen shown in Fig. 4C. After having passed through STEPS 250, 255, the microcomputer 31 repeatedly executes STEPS 220, 260 through 275, 230 and 235. It is monitored in STEP 235 whether or not operation of a dummy switch has been performed.

- 5 In this case, it takes a sufficiently long time from display of the screen shown in Fig. 4C to selective operation of the dummy switch a2-5. Therefore, the value of the timer T continues to increase and becomes longer than the reference time period  $T_a$ . Accordingly, the microcomputer 31 makes a positive judgment in STEP 260, proceeds to STEP 225 to set the
- 10 post-cancel-of-nullification operation number  $n$  to "0", and proceeds to STEP 230 to cancel nullification of operation of a dummy switch. However, at this stage, since the operation of the dummy switch has not been nullified, execution of STEP 230 does not cause any changes. Thereafter, the microcomputer 31 repeatedly executes STEPS 235, 220, 260, 225 and 230.
- 15 It is monitored in STEP 235 whether or not operation of a dummy switch has been performed.

- If the dummy switch a2-5 is thereby selectively operated, the microcomputer 31 makes a positive judgment in STEP 235, executes STEPS 240 through 255, and returns to STEP 220. At this moment, through
- 20 execution of STEP 250, the post-cancel-of-nullification operation number  $n$  that has been set to "0" in STEP 225 becomes equal to "1". Consequently in STEP 265, which follows STEPS 220, 260, a screen-watching estimated time period  $I = 2$  (seconds) corresponding to the number  $j = 6$  of dummy switches included in the screen shown in Fig. 4C is read out. This is stored as a
- 25 screen-watching estimated time period  $I(n) = I(1)$ . Accordingly, the summation screen-watching time period  $Z$  calculated in STEP 270 is equal to  $I(1) = 2$  (seconds). Thus, the microcomputer 31 makes a negative judgment in STEP 275, and proceeds to STEP 230 and the following STEPS instead of proceeding to STEP 280. Therefore, the input operation is not nullified.

If the dummy switch a2-5 is selected from the screen shown in Fig. 4C, the post-cancel-of-nullification operation number n becomes equal to "2" through execution of STEP 250. Thus, the screen-watching estimated time period  $I(2)$  calculated in later-executed STEP 260 is equal to 2 (seconds). The screen-watching estimated time period Z calculated in STEP 270 is equal to  $I(1) + I(2) = 2 + 2 = 4$  (seconds). Thus, since the summation time period Z (= 4 (seconds)) is shorter than the reference time period  $T_b$  (= 6 (seconds)), the microcomputer 31 makes a negative judgment in STEP 275 and proceeds to STEP 230 and the following STEPS instead of proceeding to STEP 280. Therefore, the operation of the dummy switch based on the screen shown in Fig. 4D (Fig. 3D) is not nullified.

(5) The following description will be made briefly with reference to Fig. 6 as to a case where a great number of dummy switches are included in one screen. In this case, the basic operation is the same as in the aforementioned cases (1) through (4). However, since nine dummy switches are included in each screen, the screen-watching estimated time period I calculated in STEP 265 is equal to 3 (seconds). Thus, in a situation where, for example, the dummy switch a has been selected from the screen shown in Fig. 6A and where the vehicle has thereafter stopped or the value of the timer T does not exceed the reference value  $T_a$ , if, for example, the dummy switch a2 is selected from the screen shown in Fig. 6B, the summation screen-watching estimated time period Z is equal to  $I(1) + I(2) + I(3) = 9$  (seconds). This is longer than the reference time period  $T_b$  (= 6 (seconds)). As a result, while operation of a dummy switch based on the fourth screen (the screen shown in Fig. 4D) is nullified in the example shown in Fig. 4, operation of a dummy switch based on the third screen (the screen shown in Fig. 6C) is nullified in the example shown in Fig. 6.

As described above, the microcomputer 31 displays new information (a screen) every time a dummy switch is selectively operated. In accordance



with the number of dummy switches included in each of the displayed screens, the microcomputer 31 estimates a time period required for the operator (the driver) to selectively operate one dummy switch from a plurality of dummy switches included in the already displayed screen and a  
 5 time period required for the operator to selectively operate one dummy switch from a plurality of dummy switches included in a new screen to be displayed and operate it, by reading them out from the table shown in Fig. 5. If the sum  $Z$  of these estimated time periods exceeds the reference time period  $T_b$ , the microcomputer 31 judges that the timing has to come to urge  
 10 the operator to pay further attention to the driving, and then nullifies selective operation of the dummy switch.

Furthermore, if the vehicle has stopped in a state where selective operation of a dummy switch is nullified, the microcomputer 31 judges that the operator (the driver) may pay attention to selective operation of a dummy  
 15 switch, and cancels nullification of selective operation of the dummy switch. In a state where selective operation of a dummy switch has been nullified, if a sufficient time period (a time period corresponding to the reference value  $T_a$ ) has elapsed since last operation of a dummy switch, the microcomputer 31 judges that the driver has increased his or her attention to the driving,  
 20 and cancels nullification of selective operation of the dummy switch. In addition, if nullification of input operation has been canceled, it is necessary to prevent a decrease in operability from being caused by excessive nullification of dummy switches. For this purpose, a sum  $Z$  of the screen-watching estimated time periods  $I$  since cancel of the nullification is  
 25 calculated, and a judgment is made based on the summation time period  $Z$  as to the necessity for nullification.

The aforementioned first embodiment can also be interpreted as a method of switching display of screens for image display devices. That is, the method of switching screens according to the first embodiment is constructed

as follows. In an image display device, if a dummy switch designed as a switch for change-over of lists extending over some screens has been operated (i.e. if the summation time period Z has become longer than a time period corresponding to the reference value  $T_b$ ), while the vehicle is  
5 traveling, list screens (screens including a plurality of dummy switches) are prevented from being switched for a predetermined time period (a time period corresponding to the reference value  $T_a$ , for example, 10 to 30 seconds), no matter how many times the switch for change-over of the lists is operated. If the switch for change-over of the lists has been operated after  
10 the lapse of the predetermined time period, the list screens are switched. This ensures that the driver spends a certain amount of time looking ahead instead of focusing attention on the screens. Even if the screens have been scrolled while the vehicle is traveling, the driver can feel relaxed.

Next, a control apparatus for input screens according to a second  
15 embodiment of the invention will be described. As shown in Fig. 7, this control apparatus is structurally different from that of the first embodiment shown in Fig. 1 only in that it is provided with a remote control device 32. This remote control device 32 is intended to selectively operate one of a plurality of dummy switches displayed by the display unit 10. The remote  
20 control device 32 has a joystick 32a and a determining button 32b, and is constructed to allow communication with the microcomputer 31 of the control unit 30. The joystick 32a can be switched in top-and-bottom directions and left-and-right directions.

A method of selectively operating a dummy switch by means of the joystick  
25 32a will now be described. First of all, a specific one of a plurality of dummy switches included in the screen of the display unit 10 is displayed in such a manner that it can be distinguished from the other dummy switches. This will hereinafter be referred to as a marking. If the determining button is pressed in this state, a dummy switch that has been marked is operated.

If the operator presses one of top, bottom, left and right portions of the joystick 32a before pressing the determining button 32b, the marking moves to an adjacent switch located in a direction corresponding to the direction in which the joystick 32a is pressed. If the joystick 32a is operated in this manner and if the determining button 32b is pressed as soon as a desired dummy switch is marked, the dummy switch is operated. Accordingly, in the case where a dummy switch is selectively operated by means of the joystick 32a, more time is required in comparison with the case where the operator selectively operates a dummy switch by touching a screen of the display unit 10 with a finger.

In the second embodiment, a screen-watching estimated time period is estimated in accordance with a method of selectively operating a dummy switch. To be more specific, STEPS 805 through 815 shown in Fig. 8 are interposed among STEPS 200 through 205 of the routine shown in Fig. 2. That is, if the menu switch 21 is operated, the microcomputer 31 proceeds from STEP 200 to STEP 805 to judge whether the method of selectively operating a predetermined dummy switch is realized by the joystick 32a or by touching the screen of the display unit 10. The method of selective operation is set by means of an initializing screen (not shown).

If the method of selectively operating a dummy switch is realized by the joystick 32a, the microcomputer 31 proceeds to STEP 810 and replaces the table used in STEP 265 shown in Fig. 2 with a table shown in Fig. 9. If the method of selectively operating a dummy switch is not realized by the joystick 32a, the microcomputer 31 proceeds to STEP 815 to replace the table used in STEP 265 with the table shown in Fig. 5. The table shown in Fig. 9 is composed of preliminarily experimentally gathered data of a time period (a screen-watching estimated time period I) required for the operator to watch a screen until he or she selectively operates one of a plurality of dummy switches included in the screen, in connection with the number of dummy

switches included in the screen. This table is stored in a memory (not shown) of the control unit 30. As is apparent from the foregoing description, the screen-watching estimated time period I for a screen including a certain number of dummy switches is longer in the table shown in Fig. 9 than in the table shown in Fig. 5.

Thereby, the microcomputer 31 reads out in STEP 265 a screen-watching estimated time period I corresponding to the method of selectively operating a dummy switch, calculates a sum Z of screen-watching estimated time periods I in STEP 270, and performs a nullification processing of the dummy switch in accordance with the summation time period Z by executing STEPS 275, 280. Accordingly, the summation time period Z can be calculated precisely irrespective of methods of selectively operating a dummy switch. Therefore, the driver can keep paying more careful attention to the driving.

As described above, according to the respective embodiments of the invention, selective operation of a dummy switch is appropriately regulated. The invention is not limited to the aforementioned embodiments, and various modification examples can be adopted within the scope of the invention. For example, in the routine shown in Fig. 2, the value of the timer T is set to "0" in STEP 215. However, it is also possible to employ a construction wherein the value of the timer T is set to its maximum in STEP 215, wherein a positive judgment is made in STEP 260 if the menu switch 21 is operated while the vehicle is traveling, and wherein the microcomputer proceeds to STEPS 265 and the following STEPS to regulate operation of a dummy switch based on the sum Z of screen-watching time periods I.

In the aforementioned embodiments, a screen completely different from the previously displayed screen (information) is displayed every time a dummy switch is selectively operated. However, the invention is also applicable, for example, to a case where when the operator inputs numbers constituting a phone number or the like one by one using dummy numeric

keys that are constantly displayed on a screen, the inputted numbers are sequentially displayed within a predetermined frame of the screen on which the numeric keys are displayed.

11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247  
248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
260  
261  
262  
263  
264  
265  
266  
267  
268  
269  
270  
271  
272  
273  
274  
275  
276  
277  
278  
279  
280  
281  
282  
283  
284  
285  
286  
287  
288  
289  
290  
291  
292  
293  
294  
295  
296  
297  
298  
299  
300  
301  
302  
303  
304  
305  
306  
307  
308  
309  
310  
311  
312  
313  
314  
315  
316  
317  
318  
319  
320  
321  
322  
323  
324  
325  
326  
327  
328  
329  
330  
331  
332  
333  
334  
335  
336  
337  
338  
339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
350  
351  
352  
353  
354  
355  
356  
357  
358  
359  
360  
361  
362  
363  
364  
365  
366  
367  
368  
369  
370  
371  
372  
373  
374  
375  
376  
377  
378  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
390  
391  
392  
393  
394  
395  
396  
397  
398  
399  
400  
401  
402  
403  
404  
405  
406  
407  
408  
409  
410  
411  
412  
413  
414  
415  
416  
417  
418  
419  
420  
421  
422  
423  
424  
425  
426  
427  
428  
429  
430  
431  
432  
433  
434  
435  
436  
437  
438  
439  
440  
441  
442  
443  
444  
445  
446  
447  
448  
449  
450  
451  
452  
453  
454  
455  
456  
457  
458  
459  
460  
461  
462  
463  
464  
465  
466  
467  
468  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
480  
481  
482  
483  
484  
485  
486  
487  
488  
489  
490  
491  
492  
493  
494  
495  
496  
497  
498  
499  
500  
501  
502  
503  
504  
505  
506  
507  
508  
509  
510  
511  
512  
513  
514  
515  
516  
517  
518  
519  
520  
521  
522  
523  
524  
525  
526  
527  
528  
529  
530  
531  
532  
533  
534  
535  
536  
537  
538  
539  
540  
541  
542  
543  
544  
545  
546  
547  
548  
549  
550  
551  
552  
553  
554  
555  
556  
557  
558  
559  
560  
561  
562  
563  
564  
565  
566  
567  
568  
569  
570  
571  
572  
573  
574  
575  
576  
577  
578  
579  
580  
581  
582  
583  
584  
585  
586  
587  
588  
589  
590  
591  
592  
593  
594  
595  
596  
597  
598  
599  
600  
601  
602  
603  
604  
605  
606  
607  
608  
609  
610  
611  
612  
613  
614  
615  
616  
617  
618  
619  
620  
621  
622  
623  
624  
625  
626  
627  
628  
629  
630  
631  
632  
633  
634  
635  
636  
637  
638  
639  
640  
641  
642  
643  
644  
645  
646  
647  
648  
649  
650  
651  
652  
653  
654  
655  
656  
657  
658  
659  
660  
661  
662  
663  
664  
665  
666  
667  
668  
669  
670  
671  
672  
673  
674  
675  
676  
677  
678  
679  
680  
681  
682  
683  
684  
685  
686  
687  
688  
689  
690  
691  
692  
693  
694  
695  
696  
697  
698  
699  
700  
701  
702  
703  
704  
705  
706  
707  
708  
709  
710  
711  
712  
713  
714  
715  
716  
717  
718  
719  
720  
721  
722  
723  
724  
725  
726  
727  
728  
729  
730  
731  
732  
733  
734  
735  
736  
737  
738  
739  
740  
741  
742  
743  
744  
745  
746  
747  
748  
749  
750  
751  
752  
753  
754  
755  
756  
757  
758  
759  
760  
761  
762  
763  
764  
765  
766  
767  
768  
769  
770  
771  
772  
773  
774  
775  
776  
777  
778  
779  
780  
781  
782  
783  
784  
785  
786  
787  
788  
789  
790  
791  
792  
793  
794  
795  
796  
797  
798  
799  
800  
801  
802  
803  
804  
805  
806  
807  
808  
809  
810  
811  
812  
813  
814  
815  
816  
817  
818  
819  
820  
821  
822  
823  
824  
825  
826  
827  
828  
829  
830  
831  
832  
833  
834  
835  
836  
837  
838  
839  
840  
841  
842  
843  
844  
845  
846  
847  
848  
849  
850  
851  
852  
853  
854  
855  
856  
857  
858  
859  
860  
861  
862  
863  
864  
865  
866  
867  
868  
869  
870  
871  
872  
873  
874  
875  
876  
877  
878  
879  
880  
881  
882  
883  
884  
885  
886  
887  
888  
889  
890  
891  
892  
893  
894  
895  
896  
897  
898  
899  
900  
901  
902  
903  
904  
905  
906  
907  
908  
909  
910  
911  
912  
913  
914  
915  
916  
917  
918  
919  
920  
921  
922  
923  
924  
925  
926  
927  
928  
929  
930  
931  
932  
933  
934  
935  
936  
937  
938  
939  
940  
941  
942  
943  
944  
945  
946  
947  
948  
949  
950  
951  
952  
953  
954  
955  
956  
957  
958  
959  
960  
961  
962  
963  
964  
965  
966  
967  
968  
969  
970  
971  
972  
973  
974  
975  
976  
977  
978  
979  
980  
981  
982  
983  
984  
985  
986  
987  
988  
989  
990  
991  
992  
993  
994  
995  
996  
997  
998  
999  
1000  
1001  
1002  
1003  
1004  
1005  
1006  
1007  
1008  
1009  
1010  
1011  
1012  
1013  
1014  
1015  
1016  
1017  
1018  
1019  
1020  
1021  
1022  
1023  
1024  
1025  
1026  
1027  
1028  
1029  
1030  
1031  
1032  
1033  
1034  
1035  
1036  
1037  
1038  
1039  
1040  
1041  
1042  
1043  
1044  
1045  
1046  
1047  
1048  
1049  
1050  
1051  
1052  
1053  
1054  
1055  
1056  
1057  
1058  
1059  
1060  
1061  
1062  
1063  
1064  
1065  
1066  
1067  
1068  
1069  
1070  
1071  
1072  
1073  
1074  
1075  
1076  
1077  
1078  
1079  
1080  
1081  
1082  
1083  
1084  
1085  
1086  
1087  
1088  
1089  
1090  
1091  
1092  
1093  
1094  
1095  
1096  
1097  
1098  
1099  
1100  
1101  
1102  
1103  
1104  
1105  
1106  
1107  
1108  
1109  
1110  
1111  
1112  
1113  
1114  
1115  
1116  
1117  
1118  
1119  
1120  
1121  
1122  
1123  
1124  
1125  
1126  
1127  
1128  
1129  
1130  
1131  
1132  
1133  
1134  
1135  
1136  
1137  
1138  
1139  
1140  
1141  
1142  
1143  
1144  
1145  
1146  
1147  
1148  
1149  
1150  
1151  
1152  
1153  
1154  
1155  
1156  
1157  
1158  
1159  
1160  
1161  
1162  
1163  
1164  
1165  
1166  
1167  
1168  
1169  
1170  
1171  
1172  
1173  
1174  
1175  
1176  
1177  
1178  
1179  
1180  
1181  
1182  
1183  
1184  
1185  
1186  
1187  
1188  
1189  
1190  
1191  
1192  
1193  
1194  
1195  
1196  
1197  
1198  
1199  
1200  
1201  
1202  
1203  
1204  
1205  
1206  
1207  
1208  
1209  
1210  
1211  
1212  
1213  
1214  
1215  
1216  
1217  
1218  
1219  
1220  
1221  
1222  
1223  
1224  
1225  
1226  
1227  
1228  
1229  
1230  
1231  
1232  
1233  
1234  
1235  
1236  
1237  
1238  
1239  
1240  
1241  
1242  
1243  
1244  
1245  
1246  
1247  
1248  
1249  
1250  
1251  
1252  
1253  
1254  
1255  
1256  
1257  
1258  
1259  
1260  
1261  
1262  
1263  
1264  
1265  
1266  
1267  
1268  
1269  
1270  
1271  
1272  
1273  
1274  
1275  
1276  
1277  
1278  
1279  
1280  
1281  
1282  
1283  
1284  
1285  
1286  
1287  
1288  
1289  
1290  
1291  
1292  
1293  
1294  
1295  
1296  
1297  
1298  
1299  
1300  
1301  
1302  
1303  
1304  
1305  
1306  
1307  
1308  
1309  
1310  
1311  
1312  
1313  
1314  
1315  
1316  
1317  
1318  
1319  
1320  
1321  
1322  
1323  
1324  
1325  
1326  
1327  
1328  
1329  
1330  
1331  
1332  
1333  
1334  
1335  
1336  
1337  
1338  
1339  
1340  
1341  
1342  
1343  
1344  
1345  
1346  
1347  
1348  
1349  
1350  
1351  
1352  
1353  
1354  
1355  
1356  
1357  
1358  
1359  
1360  
1361  
1362  
1363  
1364  
1365  
1366  
1367  
1368  
1369  
1370  
1371  
1372  
1373  
1374  
1375  
1376  
1377  
1378  
1379  
1380  
1381  
1382  
1383  
1384  
1385  
1386  
1387  
1388  
1389  
1390  
1391  
1392  
1393  
1394  
1395  
1396  
1397  
1398  
1399  
1400  
1401  
1402  
1403  
1404  
1405  
1406  
1407  
1408  
1409  
1410  
1411  
1412  
1413  
1414  
1415  
1416  
1417  
1418  
1419  
1420  
1421  
1422  
1423  
1424  
1425  
1426  
1427  
1428  
1429  
1430  
1431  
1432  
1433  
1434  
1435  
1436  
1437  
1438  
1439  
1440  
1441  
1442  
1443  
1444  
1445  
1446  
1447  
1448  
1449  
1450  
1451  
1452  
1453  
1454  
1455  
1456  
1457  
1458  
1459  
1460  
1461  
1462  
1463  
1464  
1465  
1466  
1467  
1468  
1469  
1470  
1471  
1472  
1473  
1474  
1475  
1476  
1477  
1478  
1479  
1480  
1481  
1482  
1483  
1484  
1485  
1486  
1487  
1488  
1489  
1490  
1491  
1492  
1493  
1494  
1495  
1496  
1497  
1498  
1499  
1500  
1501  
1502  
1503  
1504  
1505  
1506  
1507  
1508  
1509  
1510  
1511  
1512  
1513  
1514  
1515  
1516  
1517  
1518  
1519  
1520  
1521  
1522  
1523  
1524  
1525  
1526  
1527  
1528  
1529  
1530  
1531  
1532  
1533  
1534  
1535  
1536  
1537  
1538  
1539  
1540  
1541  
1542  
1543  
1544  
1545  
1546  
1547  
1548  
1549  
1550  
1551  
1552  
1553  
1554  
1555  
1556  
1557  
1558  
1559  
1560  
1561  
1562  
1563  
1564  
1565  
1566  
1567  
1568  
1569  
1570  
1571  
1572  
1573  
1574  
1575  
1576  
1577  
1578  
1579  
1580  
1581  
1582  
1583  
1584  
1585  
1586  
1587  
1588  
1589  
1590  
1591  
1592  
1593  
1594  
1595  
1596  
1597  
1598  
1599  
1600  
1601  
1602  
1603  
1604  
1605  
1606  
1607  
1608  
1609  
1610  
1611  
1612  
1613  
1614  
1615  
1616  
1617  
1618  
1619  
1620  
1621  
1622  
1623  
1624  
1625  
1626  
1627  
1628  
1629  
1630  
1631  
1632  
1633  
1634  
1635  
1636  
1637  
1638  
1639  
1640  
1641  
1642  
1643  
1644  
1645  
1646  
1647  
1648  
1649  
1650  
1651  
1652  
1653  
1654  
1655  
1656  
1657  
1658  
1659  
1660  
1661  
1662  
1663  
1664  
1665  
1666  
1667  
1668  
1669  
1670  
1671  
1672  
1673  
1674  
1675  
1676  
1677  
1678  
1679  
1680  
1681  
1682  
1683  
1684  
1685  
1686  
1687  
1688  
1689  
1690  
1691  
1692  
1693  
1694  
1695  
1696  
1697  
1698  
1699  
1700  
1701  
1702  
1703  
1704  
1705  
1706  
1707  
1708  
1709  
1710  
1711  
1712  
1713  
1714  
1715  
1716  
1717  
1718  
1719  
1720  
1721  
1722  
1723  
1724  
1725  
1726  
1727  
1728  
1729  
1730  
1731  
1732  
1733  
1734  
1735  
1736  
1737  
1738  
1739  
1740  
1741  
1742  
1743  
1744  
1745  
1746  
1747  
1748  
1749  
1750  
1751  
1752  
1753  
1754  
1755  
1756  
1757  
1758  
1759  
1760  
1761  
1762  
1763  
1764  
1765  
1766  
1767  
1768  
1769  
1770  
1771  
1772  
1773  
1774  
1775  
1776  
1777  
1778  
1779  
1780  
1781  
1782  
1783  
1784  
1785  
1786  
1787  
1788  
1789  
1790  
1791  
1792  
1793  
1794  
1795  
1796  
1797  
1798  
1799  
1800  
1801  
1802  
1803  
1804  
1805  
1806  
1807  
1808  
1809  
1810  
1811  
1812  
1813  
1814  
1815  
1816  
1817  
1818  
1819  
1820  
1821  
1822  
1823  
1824  
1825  
1826  
1827  
1828  
1829  
1830  
1831  
1832  
1833  
1834  
1835  
1836  
1837  
1838  
1839  
1840  
1841  
1842  
1843  
1844  
1845  
1846  
1847  
1848  
1849  
1850  
1851  
1852  
1853  
1854  
1855  
1856  
1857  
1858  
1859  
1860  
1861  
1862  
1863  
1864  
1865  
1866  
1867  
1868  
1869  
1870  
1871  
1872  
1873  
1874  
1875  
1876  
1877  
1878  
1879  
1880  
1881  
1882  
1883  
1884  
1885  
1886  
1887  
1888  
1889  
1890  
1891  
1892  
1893  
1894  
1895  
1896  
1897  
1898  
1899  
1900  
1901  
1902  
1903  
1904  
1905  
1906  
1907  
1908  
1909  
1910  
1911  
1912  
1913  
1914  
1915  
1916  
1917  
1918  
1919  
1920  
1921  
1922  
1923  
1924  
1925  
1926  
1927  
1928  
1929  
1930  
1931  
1932  
1933  
1934  
1935  
1936  
1937  
1938  
1939  
1940  
1941  
1942  
1943  
1944  
1945  
1946  
1947  
1948  
1949  
1950  
1951  
1952  
1953  
1954  
1955  
1956  
1957  
1958  
1959  
1960  
1961  
1962  
1963  
1964  
1965  
1966  
1967  
1968  
1969  
1970  
1971  
1972  
1973  
1974  
1975  
1976  
1977  
1978  
1979  
1980  
1981  
1982  
1983  
1984  
1985  
1986  
1987  
1988  
1989  
1990  
1991  
1992  
1993  
1994  
1995  
1996  
1997  
1998  
1999  
2000  
2001  
2002  
2003  
2004  
2005  
2006  
2007  
2008  
2009  
2010  
2011  
2012  
2013  
2014  
2015  
2016  
2017  
2018  
2019  
2020  
2021  
2022  
2023  
2024  
2025  
2026  
2027  
2028  
2029  
2030  
2031  
2032  
2033  
2034  
2035  
2036  
2037  
2038  
2039  
2040  
2041  
2042  
2043  
2044  
2045  
2046  
2047  
2048  
2049  
2050  
2051  
2052  
2053  
2054  
2055  
2056  
2057  
2058  
2059  
2060  
2061  
2062  
2063  
2064  
2065  
2066  
2067  
2068  
2069  
2070  
2071  
2072  
2073  
2074  
2075  
2076  
2077  
2078  
2079  
2080  
2081  
2082  
2083  
2084  
2085  
2086  
2087  
2088  
2089  
2090  
2091  
2092  
2093  
2094  
2095  
2096  
2097  
2098  
2099  
2100  
2101  
2102  
2103  
2104  
2105  
2106  
2107  
2108  
2109  
2110  
2111  
2112  
2113  
2114  
2115  
2116  
2117  
2118  
2119  
2120  
2121  
2122  
2123  
2124  
2125  
2126  
2127  
2128  
2129  
2130  
2131  
2132  
2133  
2134  
2135  
2136  
2137  
2138  
2139  
2140  
2141  
2142  
2143  
2144  
2145  
2146  
2147  
2148  
2149  
2150  
2151  
2152  
2153  
2154  
2155  
2156  
2157  
2158  
2159  
2160  
2161  
2162  
2163  
2164  
2165  
2166  
2167  
2168  
2169  
2170  
2171  
2172  
2173  
2174  
2175  
2176  
2177  
2178  
2179  
2180  
2181  
2182  
2183  
2184  
2185  
2186  
2187  
2188  
2189  
2190  
2191  
2192  
2193  
2194  
2195  
2196  
2197  
2198  
2199  
2200  
2201  
2202  
2203  
2204  
2205  
2206  
2207  
2208  
2209  
2210  
2211  
2212  
2213  
2214  
2215  
2216  
2217  
2218  
2219  
2220  
2221  
2222  
2223  
2224  
2225  
2226  
2227  
2228  
2229  
2230  
2231  
223

## WHAT IS CLAIMED IS:

1. A control apparatus for input screens that is installed in a vehicle and constructed to input predetermined operation performed by an operator  
 5 based on information displayed by display device as an operator guidance and change information to be displayed by the display device upon input of the operator guidance, comprising:

operation nullification device that prohibits the predetermined operation performed by the operator from being inputted as the operator guidance upon  
 10 fulfillment of a predetermined condition; and

operation nullification canceller that cancels prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance if a predetermined time period has elapsed since the prohibition against the inputting of the predetermined operation performed  
 15 by the operator as the operator guidance.

2. The control apparatus according to claim 1, wherein:

the operation nullification device is constructed to judge whether or not the predetermined condition has been fulfilled, depending on information  
 20 displayed by the display device.

3. The control apparatus according to claim 1, further comprising:

first operation device for performing the predetermined operation based on a first action made by the operator; and  
 25 second operation device for performing the predetermined operation based on a second action made by the operator, the second action being different from the first action, wherein:

the operation nullification device that judges whether or not the predetermined condition has been fulfilled, depending on whether the

predetermined operation is performed by the first operation device or by the second operation device.

4. A control apparatus for input screens that is installed in a vehicle,  
5 comprising:

screen controller that causes display device to display information including a plurality of dummy switches and changing the information displayed by the display device to information corresponding to the operated dummy switch; and

- 10 operation nullification device that nullifies operation of the dummy switch upon fulfillment of a predetermined condition and prohibits information displayed by the display device from being changed based on the operation, wherein the operation nullification device is constructed to judge whether or not the predetermined condition has been fulfilled, depending on the  
15 number of dummy switches included in information displayed by the display device.

5. The control apparatus according to claim 4, further comprising:  
operation nullification canceller that cancels nullification of operation of  
20 the dummy switch if a predetermined time period has elapsed since the start of nullification of the operation by the operation nullification device.

6. The control apparatus according to claim 4, further comprising:  
operation nullification canceller that cancels nullification of the operation  
25 of the dummy switch by the operation nullification device if the vehicle has stopped.

7. The control apparatus according to claim 4, further comprising:  
first operation device for performing the predetermined operation based on

a first action made by the operator; and

second operation device for performing the predetermined operation based on a second action made by the operator, the second action being different from the first action,

- 5 wherein the operation nullification device is constructed to judge whether or not the predetermined condition has been fulfilled, depending on whether the predetermined operation is performed by the first operation device or by the second operation device.

- 10 8. A control apparatus for input screens that is installed in a vehicle and constructed to cause display device to display information including a plurality of dummy switches and cause the display device to display new information corresponding to one of the dummy switches that has selectively been operated, comprising:

- 15 summation time period calculator that estimates a time period required for an operator to watch the displayed information to selectively operate one of the dummy switches included in the displayed information during a period from the start to the stop of the vehicle, estimates a time period required for the operator to watch newly displayed information to selectively operate one  
20 of a plurality of dummy switches included in the newly displayed information, and calculates a sum of the estimated time periods; and

- operation nullification device that nullifies operation performed by the operator for selection of one of a plurality of dummy switches included in the newly displayed information if the summation time period is longer than a  
25 reference time period, and prohibits new information corresponding to the operated dummy switch from being displayed by the display device.

9. The control apparatus according to claim 8, further comprising:  
operation nullification canceller that cancels nullification of operation of



the dummy switch if a predetermined time period has elapsed since the start of nullification of the operation by the operation nullification device.

10. The control apparatus according to claim 8, further comprising:

- 5 operation nullification canceller that cancels nullification of operation of the dummy switch by the operation nullification device if the vehicle has stopped.

11. The control apparatus according to claim 8, further comprising:

- 10 operation nullification canceller that cancels nullification of operation of the dummy switch by the operation nullification device if a predetermined time period has elapsed since the start of the nullification or if the vehicle has stopped.

- 15 12. The control apparatus according to claim 8, wherein:

the summation time period calculator is constructed to calculate the summation time period for information that is displayed after cancel of nullification of the operation.

- 20 13. The control apparatus according to claim 8, wherein:

the summation time period calculator is constructed to estimate a time period required to watch the displayed information, depending on the number of the dummy switches included in the information.

- 25 14. The control apparatus according to claim 8, further comprising:

first operation device for performing operation of the dummy switch based on a first action made by the operator; and

second operation device for performing operation of the dummy switch based on a second action made by the operator, the second action being

different from the first action,

wherein the summation time period calculator is constructed to estimate a time period required to watch the information, depending on whether the operation of the dummy switch is performed by the first operation device or  
 5 by the second operation device.

15. A control apparatus for input screens that is installed in a vehicle and constructed to input predetermined operation performed by an operator based on information displayed by display device as an operator guidance  
 10 and change information to be displayed by the display device upon input of the operator guidance, comprising:

operation nullification means for prohibiting the predetermined operation performed by the operator from being inputted as the operator guidance upon fulfillment of a predetermined condition; and

15 operation nullification cancel means for canceling prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance if a predetermined time period has elapsed since the prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance.

20 16. A control apparatus for input screens that is installed in a vehicle, comprising:

screen control means for causing display device to display information including a plurality of dummy switches and changing the information  
 25 displayed by the display device to information corresponding to the operated dummy switch; and

operation nullification means for nullifying operation of the dummy switch upon fulfillment of a predetermined condition and prohibiting information displayed by the display device from being changed based on the operation,

wherein the operation nullification means is constructed to judge whether or not the predetermined condition has been fulfilled, depending on the number of dummy switches included in information displayed by the display device.

5

17. A control apparatus for input screens that is installed in a vehicle and constructed to cause display device to display information including a plurality of dummy switches and cause the display device to display new information corresponding to one of the dummy switches that has selectively been operated, comprising:

10

summation time period calculation means for estimating a time period required for an operator to watch the displayed information to selectively operate one of the dummy switches included in the displayed information during a period from the start to the stop of the vehicle, estimating a time period required for the operator to watch newly displayed information to selectively operate one of a plurality of dummy switches included in the newly displayed information, and calculating a sum of the estimated time periods; and

15

operation nullification means for nullifying operation performed by the operator for selection of one of a plurality of dummy switches included in the newly displayed information if the summation time period is longer than a reference time period, and prohibiting new information corresponding to the operated dummy switch from being displayed by the display device.

20

25

18. A control method for input screens that is installed in a vehicle and constructed to input predetermined operation performed by an operator based on information displayed by display device as an operator guidance and change information to be displayed by the display device upon input of the operator guidance, comprising the steps of:

prohibiting the predetermined operation performed by the operator from being inputted as the operator guidance upon fulfillment of a predetermined condition; and

canceling prohibition against the inputting of the predetermined operation  
5 performed by the operator as the operator guidance if a predetermined time period has elapsed since the prohibition against the inputting of the predetermined operation performed by the operator as the operator guidance.

10 19. A control method for input screens that is installed in a vehicle, comprising the steps of:

causing display device to display information including a plurality of dummy switches and changing the information displayed by the display device to information corresponding to the operated dummy switch;

15 judging whether or not the predetermined condition has been fulfilled, depending on the number of dummy switches included in information displayed by the display device; and

nullifying operation of the dummy switch upon fulfillment of a predetermined condition and prohibiting information displayed by the  
20 display device from being changed based on the operation.

20. A control method for input screens that is installed in a vehicle and constructed to cause display device to display information including a plurality of dummy switches and cause the display device to display new  
25 information corresponding to one of the dummy switches that has selectively been operated, comprising the steps of:

estimating a time period required for an operator to watch the displayed information to selectively operate one of the dummy switches included in the displayed information during a period from the start to the stop of the

vehicle;

estimating a time period required for the operator to watch newly displayed information to selectively operate one of a plurality of dummy switches included in the newly displayed information;

- 5       calculating a sum of the estimated time periods; and

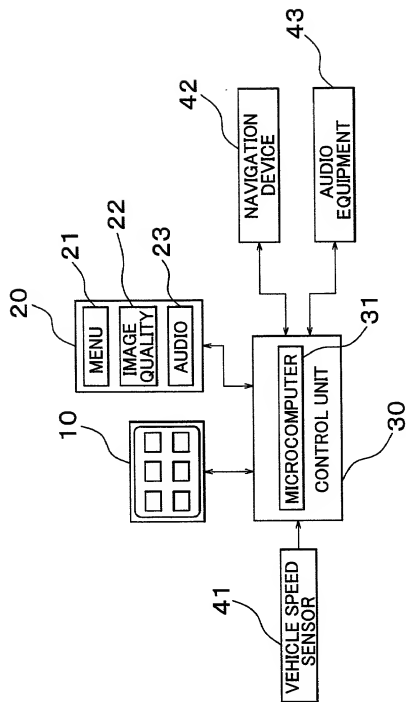
- nullifying operation performed by the operator for selection of one of a plurality of dummy switches included in the newly displayed information if the summation time period is longer than a reference time period, and prohibiting new information corresponding to the operated dummy switch
- 10     from being displayed by the display device.

## ABSTRACT OF THE DISCLOSURE

A control apparatus for input screens includes a display unit, a switch portion and a control unit including a microcomputer. If one of a menu switch of the switch portion and a plurality of dummy switches included in a screen displayed by the display unit is operated, the microcomputer causes the display unit to display a new screen including a plurality of dummy switches. The microcomputer estimates a time period required for the operator to watch a screen to operate the dummy switch, depending on the displayed screen (the number of dummy switches). If the sum of estimated time periods exceeds a reference time period, the microcomputer nullifies operation of the dummy switch to prevent the screen from being switched. After the lapse of a predetermined time period, the microcomputer cancels the nullification of the operation of the dummy switch.

15

FIG. 1



# FIG. 2

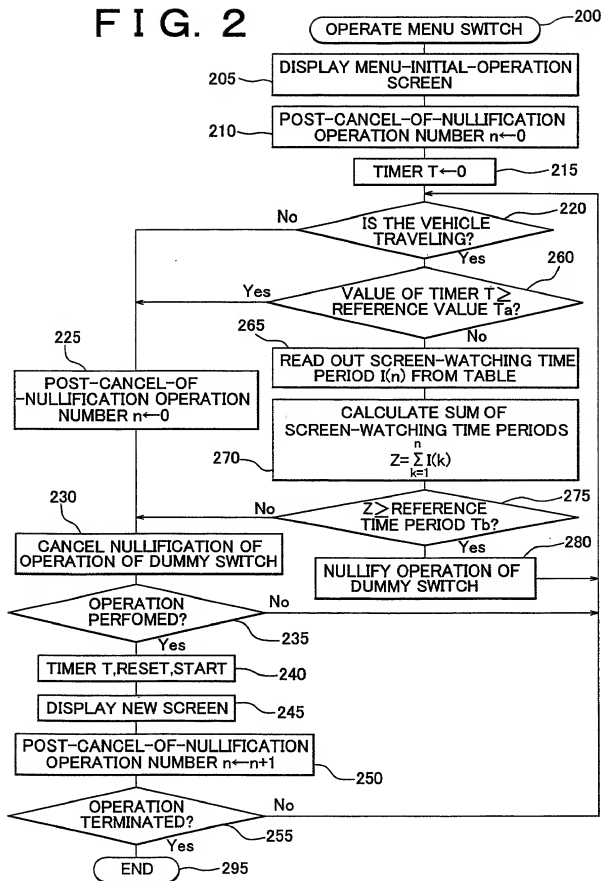




FIG. 3A

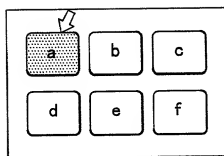


FIG. 3B

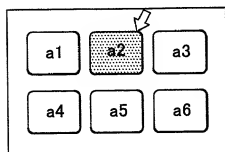


FIG. 3C

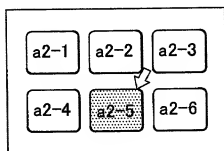


FIG. 3D

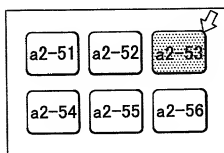


FIG. 3E

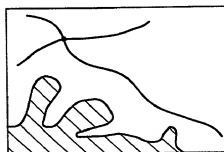


FIG. 4A

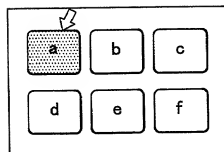


FIG. 4B

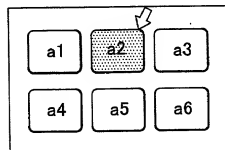


FIG. 4C

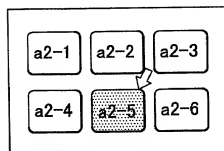
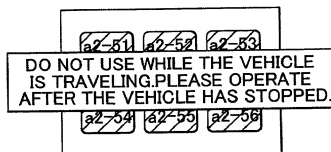


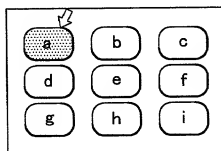
FIG. 4D



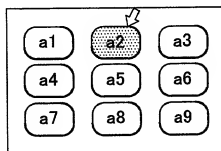
# FIG. 5

NUMBER OF DUMMY SWITCHES $j$	SCREEN-WATCHING ESTIMATED TIME PERIOD $i$
$j < 3$	1
$3 \leq j < 6$	1.5
$6 \leq j < 9$	2
$9 \leq j < 12$	3
$12 \leq j$	4

## FIG. 6A



## FIG. 6B



## FIG. 6C

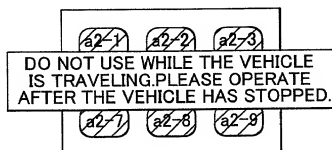
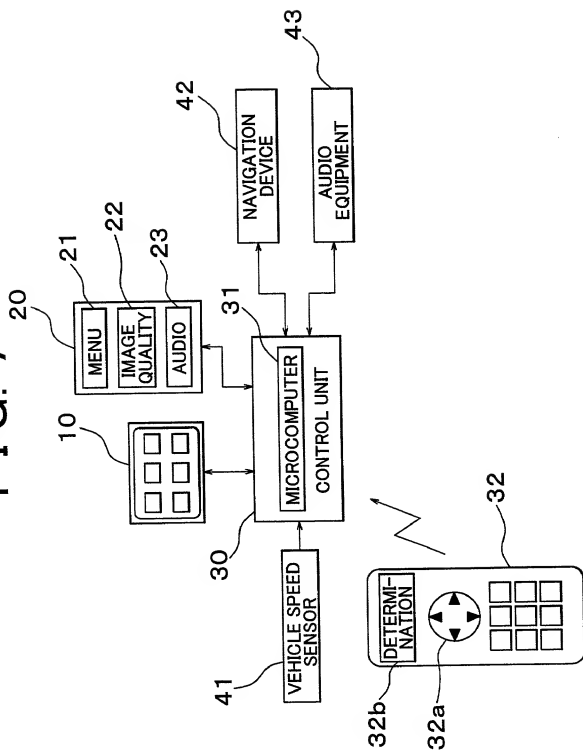
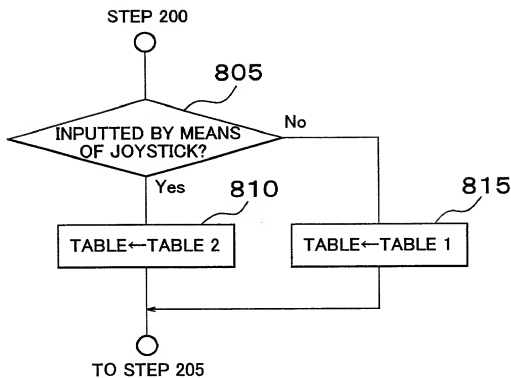


FIG. 7



# FIG. 8



# FIG. 9

NUMBER OF DUMMY SWITCHES $j$	SCREEN-WATCHING ESTIMATED TIME PERIOD $I$
$j < 3$	1.5
$3 \leq j < 6$	2
$6 \leq j < 9$	2.5
$9 \leq j < 12$	3.5
$12 \leq j$	4.5

# APPLICATION FOR UNITED STATES PATENT DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; that

I verily believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: CONTROL APPARATUS AND METHOD FOR INPUT SCREENS

described and claimed in the specification:

## Check one

- \*a. ☒ attached hereto.  
b. ☐ filed on \_\_\_\_\_ as Application No. \_\_\_\_\_ and amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

Under Title 35, U.S. Code §119, the priority benefits of the following foreign application(s) and/or United States provisional application(s) filed within one year prior to this application are hereby claimed:

**Japanese Patent Application No. 2000-256098 filed August 25, 2000**

The following application(s) for patent or inventor's certificate on this invention were filed in countries foreign to the United States of America either (a) more than one year prior to this application, or (b) before the filing date of the above-named foreign priority application(s) and/or United States provisional application(s):

I hereby appoint the following as my attorneys of record with full power of substitution and revocation to prosecute this application and to transact all business in the Patent Office:

**James A. Oliff, Reg. No. 27,075; William P. Berridge, Reg. No. 30,024;  
Kirk M. Hudson, Reg. No. 27,562; Thomas J. Pardini, Reg. No. 30,411;  
Edward P. Walker, Reg. No. 31,450; Robert A. Miller, Reg. No. 32,771;  
Mario A. Costantino, Reg. No. 33,565; and Caroline D. Dennison, Reg. No. 34,494.**

**ALL CORRESPONDENCE IN CONNECTION WITH THIS APPLICATION SHOULD BE SENT TO OLIFF & BERRIDGE, PLC, P.O. BOX 19928, ALEXANDRIA, VIRGINIA 22320, TELEPHONE (703) 836-6400.**

I hereby declare that I have reviewed and understand the contents of this Declaration, and that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## 1 Typewritten Full Name of First or Sole Inventor

Hiroshi	Kishi	
Given Name	Middle Initial	Family Name
Hiroshi		Kishi
October 27, 2000		

2 \*\*Inventor's Signature:

3 \*\*Date of Signature:

Month	Day	Year
October	27	2000

Residence:

Toyota-shi

Aichi-ken

Japan

Citizenship:

Japan

Post Office Address:

(Insert complete mailing address, including country) c/o TOYOTA JIDOSHA KABUSHIKI KAISHA

1, Toyota-cho, Toyota-shi, Aichi-ken, 471-8571 Japan

\*If Box (a.) is checked, this form may be executed only when attached to the specification (including claims).

\*\*Note to Inventor: Please sign name exactly as it appears above and insert actual date of signing.

**IF THERE IS MORE THAN ONE INVENTOR USE PAGE 2 AND PLACE AN "X" HERE** ☒

1  
2  
3

PAGE 2 OF U.S.A. DECLARATION FORM  
(Discard this page in a sole inventor application)

1 **Typewritten Full Name**  
**of Second Joint Inventor (if any)**

Hiroshi		Yamauchi
Given Name	Middle Initial	Family Name

*Hiroshi Yamauchi*

2 **\*\*Inventor's Signature:**

3 **\*\*Date of Signature:**

— October 27, 2000 —

Residence:

Kariya-shi

City

Aichi-ken

State or Province

Year

Japan

Citizenship:

Japan

Post Office Address:

(Insert complete  
mailing address,  
including country)

c/o TOYOTA JIDOSHA KABUSHIKI KAISHA

1, Toyota-cho, Toyota-shi, Aichi-ken, 471-8571 Japan

1 **Typewritten Full Name**  
**of Third Joint Inventor (if any)**

Noritada		Yoshitsugu
Given Name	Middle Initial	Family Name

*Noritada*

*Yoshitsugu*

2 **\*\*Inventor's Signature:**

3 **\*\*Date of Signature:**

— October 27, 2000 —

Residence:

Aichi-gun

City

Aichi-ken

State or Province

Year

Japan

Citizenship:

Japan

Post Office Address:

(Insert complete  
mailing address,  
including country)

c/o TOYOTA JIDOSHA KABUSHIKI KAISHA

1, Toyota-cho, Toyota-shi, Aichi-ken, 471-8571 Japan

1 **Typewritten Full Name**  
**of Fourth Joint Inventor (if any)**

Given Name	Middle Initial	Family Name

2 **\*\*Inventor's Signature:**

3 **\*\*Date of Signature:**

—

—

—

Residence:

City

State or Province

Country

Citizenship:

Post Office Address:

(Insert complete  
mailing address,  
including country)

1 **Typewritten Full Name**  
**of Fifth Joint Inventor (if any)**

Given Name	Middle Initial	Family Name

2 **\*\*Inventor's Signature:**

3 **\*\*Date of Signature:**

—

—

—

Residence:

City

State or Province

Country

Citizenship:

Post Office Address:

(Insert complete  
mailing address,  
including country)

**\*\*Note to Inventors: Please sign name exactly as it appears and insert the actual date of signing.**

**This form may be executed only when attached to the first page of the Declaration and Power of Attorney form of the application to which it pertains.**